



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

November 18, 2013

MEMORANDUM

SUBJECT: Environmental risk assessment for the FIFRA Section 3 registration of *Trichoderma harzianum* Rifai Strain KRL AG-2 20857 (also called strain T-22); PC Code 119202; EPA File Symbols 89635-R, -E, -G; Decision Nos. 471289, 471290, 471288; Submission Nos. 925622, 925623, 925617; DP Barcode Nos. 409556, 409557, 409541; MRIDs 48972411, 48971909, 48972109

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Koppert Biological Systems, Inc. (hereafter, "Koppert") applied for a FIFRA Section 3 registration of *Trichoderma harzianum* Rifai Strain KRL AG-2 20857 (also called strain T-22) for control of fungi in several food and nonfood crops. *Trichoderma harzianum* Rifai Strain KRL-AG2 20857 is the active ingredient (a.i.) in Trium Technical (manufacturing use product or MP, EPA File Symbol 89635-R), Trium G (end use product or EP, EPA File Symbol 89635-E), and Trium WG (EP, EPA File Symbol 89635-G). The a.i. in these products was determined to be identical to the *T. harzianum* T-22 a.i. that is contained in currently registered products. Therefore, these products are considered new products that utilize an unregistered source of the active ingredient. The labeled uses and rates are also identical to currently registered products. Nontarget effects data requirements for the active ingredient were fulfilled with data or rationale submitted previously to support the current registrations of products containing *T. harzianum* T-22 and/or by citing EPA documents based on those data. This memorandum contains a review of the information cited to support the registrations of these new products.

Avian Oral and Avian Inhalation Toxicity/Pathogenicity

Koppert cited a study of avian oral pathogenicity and toxicity of *T. harzianum* T-22 in Northern bobwhite (MRID 41245908), as well as conclusions made for avian risk in EPA documents. In the cited study, no pathogenicity or toxicity was observed in bobwhite when administered 9×10^8

cfu/kg/day for five days. EPA determined that this study was acceptable. Koppert also cited their study (MRID 48972403), in which the *in vivo* growth temperature of this fungus was shown to be below 37°C. Lack of growth at or above this temperature indicates that this strain of *Trichoderma* would not grow within the bodies of birds if they were exposed, since average avian body temperature is several degrees above 37°C. Other statements from EPA documents were also cited; however, this information is sufficient to conclude that adverse effects on birds are not expected from exposure to the *T. harzianum* Rifai Strain KRL-AG2 contained in these new products.

Wild Mammal Toxicity/Pathogenicity

Koppert cites the growth temperature study described above as well as the EPA Registration Review Final Decision document. Based on the growth temperature study, *T. harzianum* Rifai Strain KRL-AG2 contained in these new products does have some growth at 36°C, although growth is reduced. Since normal mammalian body temperatures are expressed as averages, it is possible that growth of *T. harzianum* Rifai Strain KRL-AG2 can occur in some mammals under certain conditions. Koppert incorrectly cites waiver rationale for two other strains of *T. harzianum*, which does not apply to *T. harzianum* Rifai Strain KRL-AG2. Koppert also cites the conclusion that EPA made that *T. harzianum* Rifai Strain T-22 does not grow at temperatures above 25°C; however, it is clear from their own study that their strain does grow at higher temperatures. Based on the information provided in Koppert's rationale (MRID 48972411), this data requirement is satisfied based on conclusions cited from EPA documents. To support the registration of these products, Koppert should cite MRIDs of mammalian toxicity/pathogenicity studies referenced in EPA's documents on the data matrices, as long as those studies are not compensable.

Other Data Requirements

Freshwater and Marine/Estuarine Fish and Invertebrate Toxicity/Pathogenicity

For aquatic data requirements, Koppert primarily cites EPA's 2008 Registration Review Final Decision Document for *Trichoderma*. According to this document, "Data requirements for evaluating adverse effects on freshwater fish, aquatic invertebrates, and estuarine marine/organisms were waived for the original seed treatment applications. For the extension of ground applications to all agricultural crops, except those excluded from the label, the Agency relied on the public literature and reports from the company on the effects of *Trichoderma* on non-target organisms. T-22 is a soil organism and is not expected to proliferate in aquatic environments." No MRID is available to cite for fulfillment these data requirements. EPA reviewed the environmental risks associated with the expansion of uses and application methods in an ecological risk assessment (referred to as a DER in the BRAD) dated October 28, 1998. EPA determined that certain application methods would not present unreasonable risks to nontarget organisms, but that others would increase environmental exposure. EPA determined that for application methods that would significantly increase environmental exposure, additional data or rationale addressing the effects of the a.i. on freshwater fish and invertebrates would be needed. Any data or rationale submitted to support addition of those application methods to labels of products containing *T. harzianum* Rifai Strain KRL-AG2 would have been dated after

1998 and are compensable. Therefore, citation to EPA documents is appropriate for conclusions made about uses and application methods of *T. harzianum* Rifai Strain KRL-AG2 based on data submitted in 1998 or prior years.

Nontarget Plant Testing

The rationale from Koppert cites general statements regarding environmental effects on plants from the 2008 Registration Review Final Decision document, and states that certain crops are excluded from their proposed labels. The BRAD states, “The Agency reviewed published and submitted information regarding potential phytopathogenicity of T-22 to non-target plants (BPPD DER dated 10/29/98)...the Agency decided not to include sugarcane, peach, rice, mushrooms, kiwi, tobacco, wheat, barley, oats, lemon (seedlings), apple (fruit), and chickpea until the reports regarding the potential for T-22 phytotoxicity and/or pathogenicity on these crops are satisfactorily addressed. By 2005, the registrant had provided rationales to support including wheat on the label with EPA Reg. No. 68539-3.” Data on phytotoxicity in certain crops was submitted by Bioworks, Inc. (the company holding current registrations of products containing *T. harzianum* T-22) in a letter dated July 1998. EPA considered this information in its ecological risk assessment from 1998, which states specifically, “Use sites should not include sugarcane, peach, rice, mushrooms, kiwi, tobacco, wheat, barley, oats, lemon, apples, and chickpea until the reports regarding these plants and *T. harzianum* are satisfactorily addressed regarding the potential for phytotoxicity and/or phytopathogenicity from the proposed uses.” Data supporting changes to this list would have been submitted after 1998, and are likely compensable. Therefore, EPA can use information submitted in 1998 or in prior years, and must restrict uses according to the original list of prohibited crops.

Nontarget Insects and Honey Bees

For nontarget insects, rationale was submitted that primarily cites to conclusions made by EPA in the 2008 Registration Review Final Decision document. EPA concluded that there were no concerns for nontarget insects for certain uses in the ecological risk assessment from 1998 referenced above. However, the risk assessment stated that the data requirement for nontarget insects was not satisfied for specific uses proposed for products containing *T. harzianum* Rifai Strain KRL-AG2 at that time. Therefore, for the proposed products, EPA can rely on past conclusions made for nontarget insects in the Registration Review Final Document that are based on data submitted by 1998. Any data supporting changes to those uses would have been submitted after 1998 and are compensable.

For honey bees, Koppert cites the same information from the EPA Registration Review Final Decision, as well as three studies from the literature. Bilu et al. (2004) and Shafir et al. (2006) are evaluations of the use of honey bees as dispersal agents for microbial pesticides. In both studies, a different strain of *Trichoderma harzianum* (strain T-39) was used. Koppert states that the studies did not report effects on bees; however, honey bee effects were not examined in either study, and these papers do not provide sufficient support for that conclusion. The other study cited is an experiment with bumble bees (*Bombus terrestris*) exposed to Triatum-P containing *T. harzianum* T-22 supplied by Koppert. Bees were exposed to Triatum-P by oral and contact routes and through treated pollen for a period of up to 11 weeks. No significant adverse

effects were observed on the bumble bees exposed at 6×10^8 cfu/L, which corresponded to the maximum field rate. Assuming that the strain of *Trichoderma harzianum* T-22 in Trianum-P is identical to the a.i. in the proposed products, these data provide support to show that adverse effects to bees are not expected for *T. harzianum* Rifai Strain KRL-AG2. However, Koppert should provide data confirming this assumption to allow EPA to conclude that this data requirement is fulfilled.

Conclusions

Much of the rationale submitted by Koppert relies on conclusions made in EPA documents. As described above, products containing *T. harzianum* Rifai Strain KRL-AG2 initially were registered for seed treatment, and applications to expand the uses and application methods were made subsequent to the initial registrations. EPA reviewed the applications to expand the use sites and application methods in 1998, and determined that certain application methods would not significantly increase the level of *T. harzianum* Rifai Strain KRL-AG2 in the environment, and that certain other application methods would. In the case of the latter methods, EPA determined that the registrant had not submitted sufficient nontarget organism data to show that adverse effects would not be expected as a result of the increased exposure. Application methods have since been added to the labels for products containing *T. harzianum* Rifai Strain KRL-AG2, and wheat has also been removed from the list of prohibited crops on which *T. harzianum* Rifai Strain KRL-AG2 can be used. The amendments that resulted in these changes relied on data and rationale submitted subsequently to the 1998 review. Since these data are not greater than 15 years old, they are compensable. Koppert has shown no proof of an offer to pay for the use of these data. Therefore, to assess the risks of *T. harzianum* Rifai Strain KRL-AG2 for the application methods proposed for Koppert's products, EPA cannot rely upon conclusions cited in EPA documents that were based on data or rationale submitted after 1998.

According to the 1998 ecological risk assessment, EPA determined that the following application methods would not to increase environmental exposure or cause unreasonable adverse effects to nontarget organisms:

- In-furrow soil treatment
- Greenhouse soil amendment
- Seed treatment
- Cutting or bard rooted transplants
- Greenhouse drench for potting mix or soil, and
- Nursery drench for potting mix.

As noted above, the following uses were also prohibited: sugarcane, pechay, rice, mushrooms, kiwi, tobacco, wheat, barley, oats, lemon, apple, and chickpea.

Based on the determination from the 1998 risk assessment above, and a comparison of the proposed labels for Trianum G and Trianum WG with labels for products containing *T. harzianum* Rifai Strain KRL-AG2 based on the 1998 or prior assessments, EPA has made the following determinations for the proposed products:

Trianum G - All uses and application methods proposed for the Trianum G granular formulation can be allowed. However, the list of prohibited crops must be altered to include peach and wheat. The removal of wheat from the list of prohibited crops for *T. harzianum* Rifai Strain KRL-AG2 was accomplished with data submitted after 1998, and these data are compensable. EPA notes that peach is not in the list of prohibited uses listed in EPA's 1998 risk assessment, and is not a prohibited crop for *T. harzianum* Rifai Strain KRL-AG2.

Trianum WG – All uses and application methods proposed for Trianum WG wettable granule formulation can be allowed except field chemigation (all applicable crops). Sprinkler and flood chemigation were specifically prohibited in EPA's 1998 risk assessment, and field chemigation was subsequently added to labels of registered products containing *T. harzianum* Rifai Strain KRL-AG2 based on data submitted after 1998, which are compensable. Greenhouse chemigation is not in the list described above; however, since nontarget exposure to greenhouse uses is expected to be minimal, greenhouse chemigation can be allowed on the Trianum WG label. Additionally, the list of prohibited crops must be updated to include peach and wheat. The removal of wheat from the list of prohibited crops for *T. harzianum* Rifai Strain KRL-AG2 was accomplished with data submitted after 1998, and these data are compensable. EPA notes that peaches is not in the list of prohibited uses listed in EPA's 1998 risk assessment, and is not a prohibited crop for *T. harzianum* Rifai Strain KRL-AG2.

References

- Bilu, A., Dag, A., Elad, Y., and Shafir, S. 2004. Honey bee dispersal of biocontrol agents: an evaluation of dispensing devices. *Biocontrol Science and Technology* 14:607-617.
- Mommaerts, V., Sterk, G., Hoffmann, L., and Smagghe, G. 2009. A laboratory evaluation to determine the compatibility of microbiological control agents with the pollinator *Bombus terrestris*. *Pest Management Science* 65:949-955.
- Shafir, S., Dag, A., Bilu, A., Abu-Toamy, M., and Elad, Y. 2006. Honey bee dispersal of the biocontrol agent *Trichoderma harzianum* T39: effectiveness in suppressing *Botrytis cinerea* on strawberry under field conditions. *European Journal of Plant Pathology* 116:119-128.